Stoller
Hanford Office

DOE-EM/GJ783-2005

299-E13-08 (A5856)
Log Data Report

Borehole Information:

Borehole: 299-E13-08 (A5856)			Site: 216-B-21 Trench		
Coordinates (WA St Plane)		GWL[1] (ft) : 346.1		GWL Date: 10/26/04	
North (m)	East (m)	Drill Date	Ground Level Elevation (ft)	Total Depth (ft)	Type
134301.719	573339.558	07/56	747.07	364	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	2.55	6 5/8	6	5/16	2.55	98
Threaded Steel	0.1	8 5/8	unknown	unknown	0.1	305.0
Slotted screen	N/A	7.5	6.75	0.22	N/A	361.0

Borehole Notes:

The logging engineer measured the 6-in. casing and stickup using a steel tape. Measurements were rounded to the nearest 1/16 in. The 8-in. casing was visible at the ground surface. Casing depths are derived from Ledgerwood (1993), which reports the 6-in. casing was placed on a packer at 98 ft. The 6 and 8-in. casings were perforated and grout emplaced in the annular space. The 8-in. casing was also perforated between 317 and 362 ft. An 8-in. KAIWELL telescoping screen was placed from 305 to 321 ft and an 8-in. Johnson screen was placed from 321 to 361 ft. Groundwater level was measured by the logging engineer at 346.1 ft from the TOC. The depth to water was measured at 343 and 337.4 ft (reference depth unknown) in 1956 and 1992, respectively.

Logging Equipment Information:

Logging System:	Gamma 1E		Type:	SGLS (70%) SN: 34TP40587A
Calibration Date:	10/04	Calibration Reference:	DOE-EM/GJ713-2004	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	3	4	
Date	10/29/04	11/01/04	11/01/04	11/02/04	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	345.0	218.0	182.0	25.0	
Finish Depth (ft)	183.0	183.0	24.0	3.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	

Log Run	1	2 Repeat	3	4	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A[2]	N/A	N/A	N/A	
Pre-Verification	AE015CAB	AE016CAB	AE016CAB	AE017CAB	
Start File	AE015000	AE016000	AE016036	AE017000	
Finish File	AE015162	AE016035	AE016194	AE017022	
Post-Verification	AE015CAA	AE016CAA	AE016CAA	AE017CAA	
Depth Return Error (in.)	0	N/A	- 2	- 1	
Comments	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.	

Logging Operation Notes:

Logging was conducted with a centralizer on the sonde for log runs 2 and 4. Logging data acquisition is referenced to the top of casing. No data were collected below groundwater. A repeat section was collected in this borehole to evaluate system performance. Before logging, the borehole was swabbed and no contamination was detected.

Analysis Notes:

Analyst:	Henwood	Date:	01/04/05	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met. The energy peak at 2615 keV was approximately 15 percent lower at the end of the day for log run 1.

A combined casing correction for 0.6345-in.-thick casing was applied to the log data between 3 and 98 ft. Between 98 and 305 ft, a correction for 0.322-in.-thick casing was applied. Below 305 ft, a correction for the slotted screen of 0.22 in. was applied, which is estimated to be the equivalent thickness based on weight percent per unit length of screen.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EOct04.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. No corrections for dead time or water were necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (^{137}Cs) detected in the borehole, naturally occurring radionuclides (^{40}K, ^{238}U, ^{232}Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead-time correction, casing corrections, or water corrections. Historical gross gamma logs acquired in 1958, 1959, 1963, 1968, and 1976 derived from Additon et al. (1978) were re-digitized and included for comparison with the current log data. A repeat log section is also included.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected between 45 and 53 ft and between 66 and 76 ft; the maximum concentration was measured at approximately 1 pCi/g at 50 ft. ^{137}Cs was also detected at sporadic locations throughout the borehole near the MDL of approximately 0.2 pCi/g.

^{60}Co was detected between 67 and 77 ft. The maximum concentration was measured at 0.3 pCi/g at 76 ft.

Historical gross gamma logs showed elevated gamma activity where the detector was saturated, from approximately 30 to 75 ft in this borehole between 1958 and 1963. By 1968, much of the activity had apparently decayed away. The activity has continued to decay away such that the remaining activity is near background levels. The only remaining gamma-emitting radionuclides measured during 2004 in this depth interval are ^{137}Cs and ^{60}Co. The dominant cause of the very high activity zone between 1958 and 1963 is likely a short-lived isotope such as ^{106}Ru.

The repeat section generally indicates good agreement of the naturally occurring KUT. The loss of detector efficiency at higher energies as observed in the verification data on 10/29/04, is exhibited by the low concentrations of ^{232}Th (2615 keV) measured during log run 1 on 10/29/04 relative to log run 2 conducted 11/01/04.

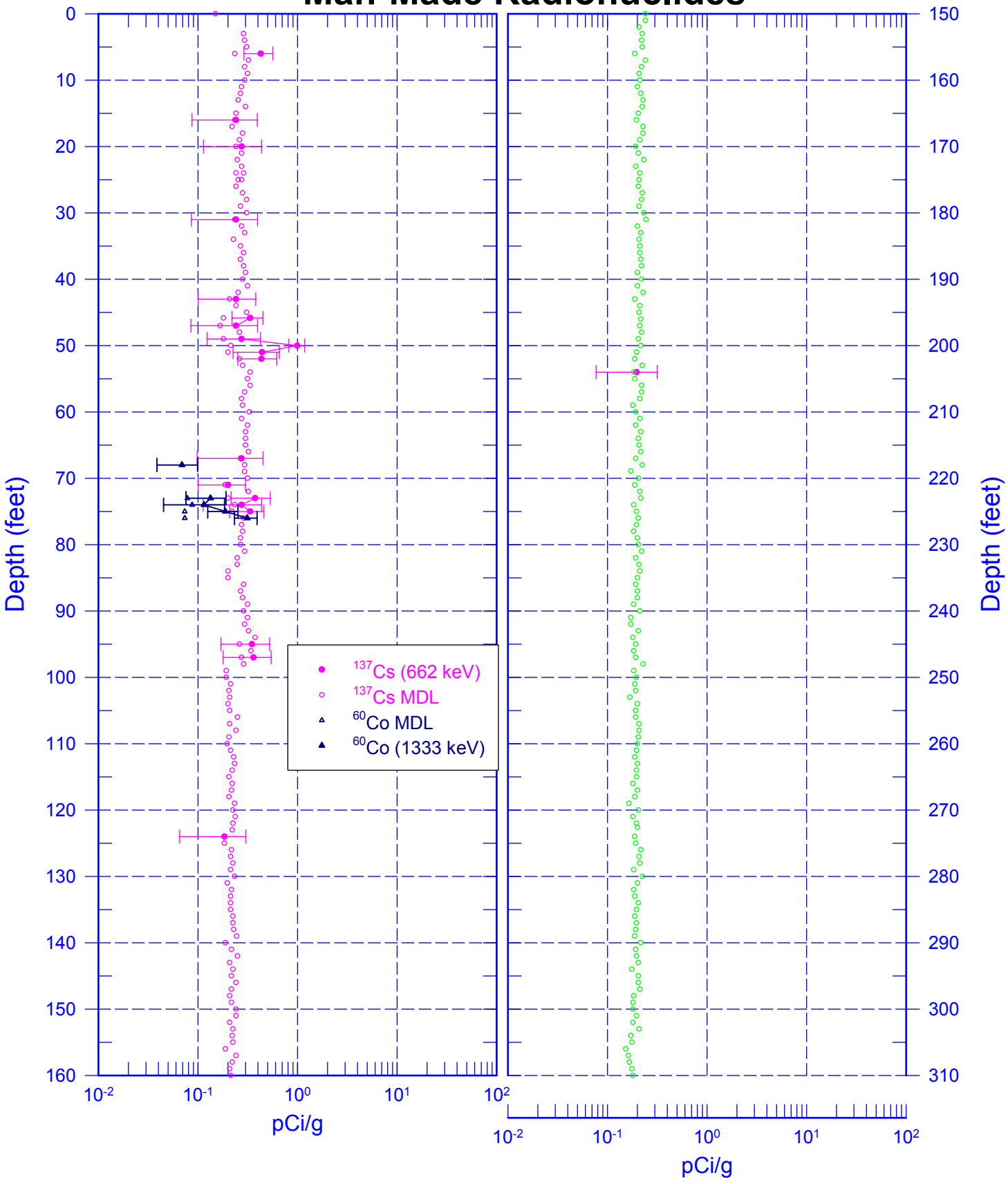
References:

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Well*s, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

[1] GWL – groundwater level
[2] N/A – not applicable

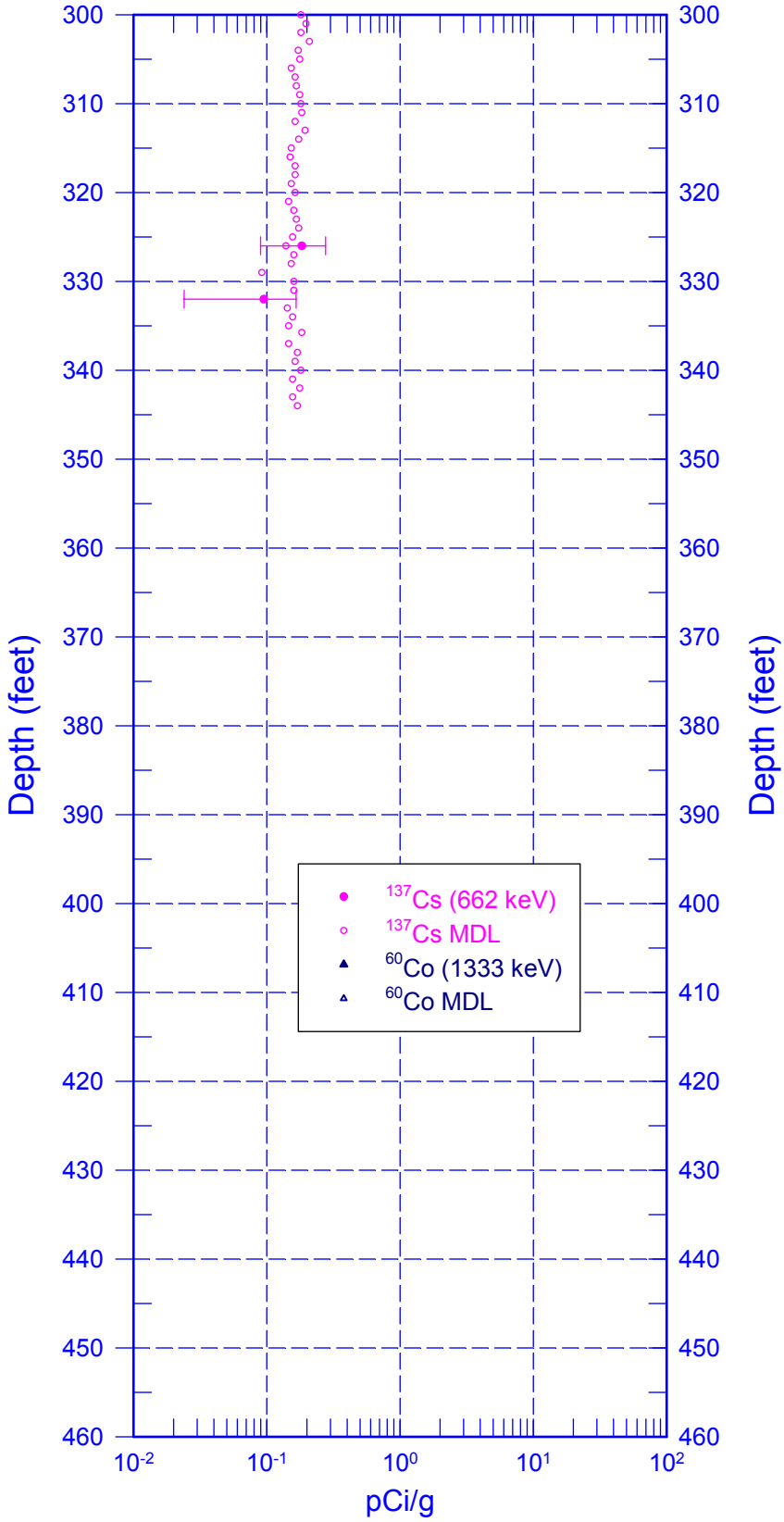
299-E13-08 (A5856)
Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 11/02/04

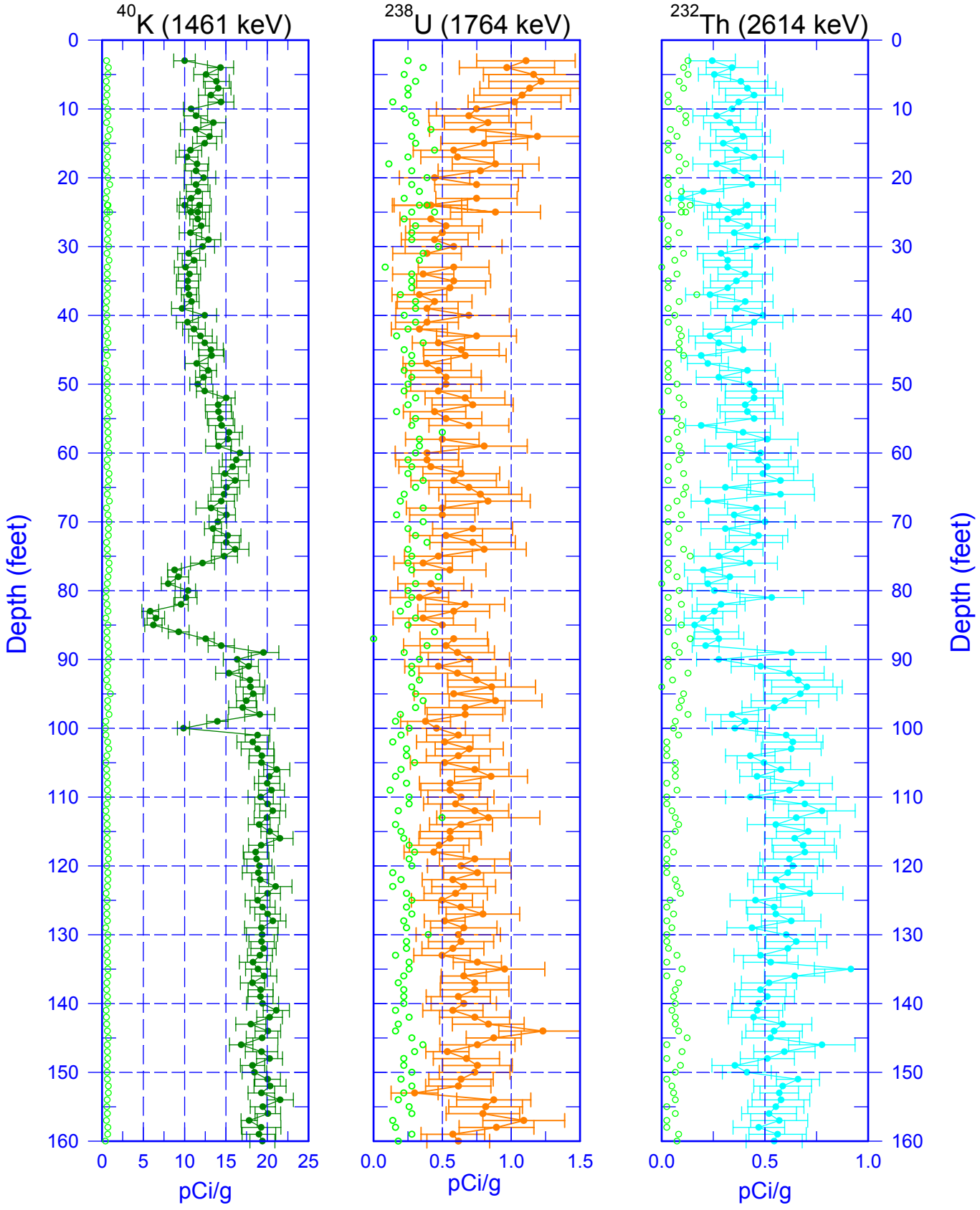
299-E13-08 (A5856)
Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 11/02/04

299-E13-08 (A5856)
Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 11/02/04

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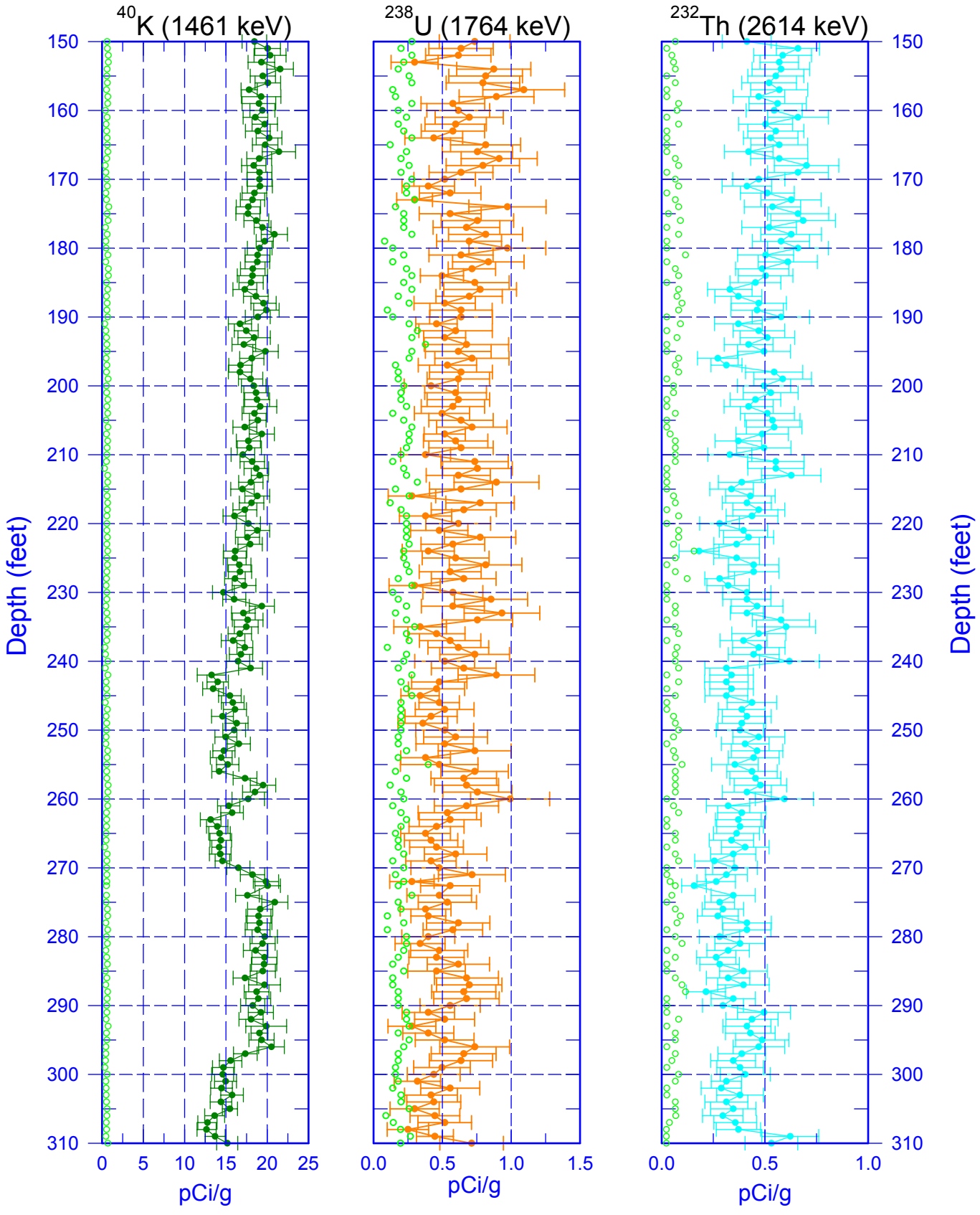
Natural Gamma Logs



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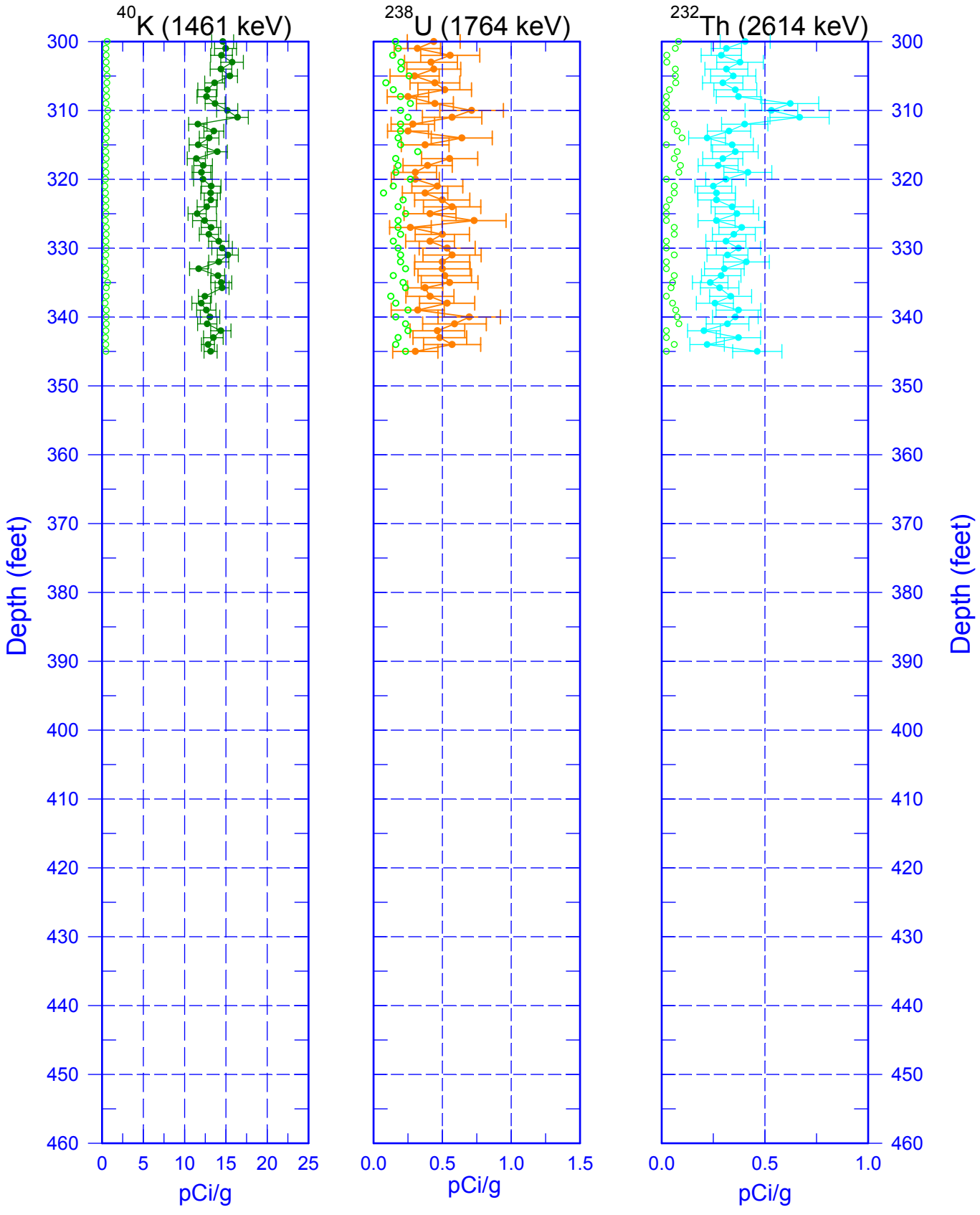
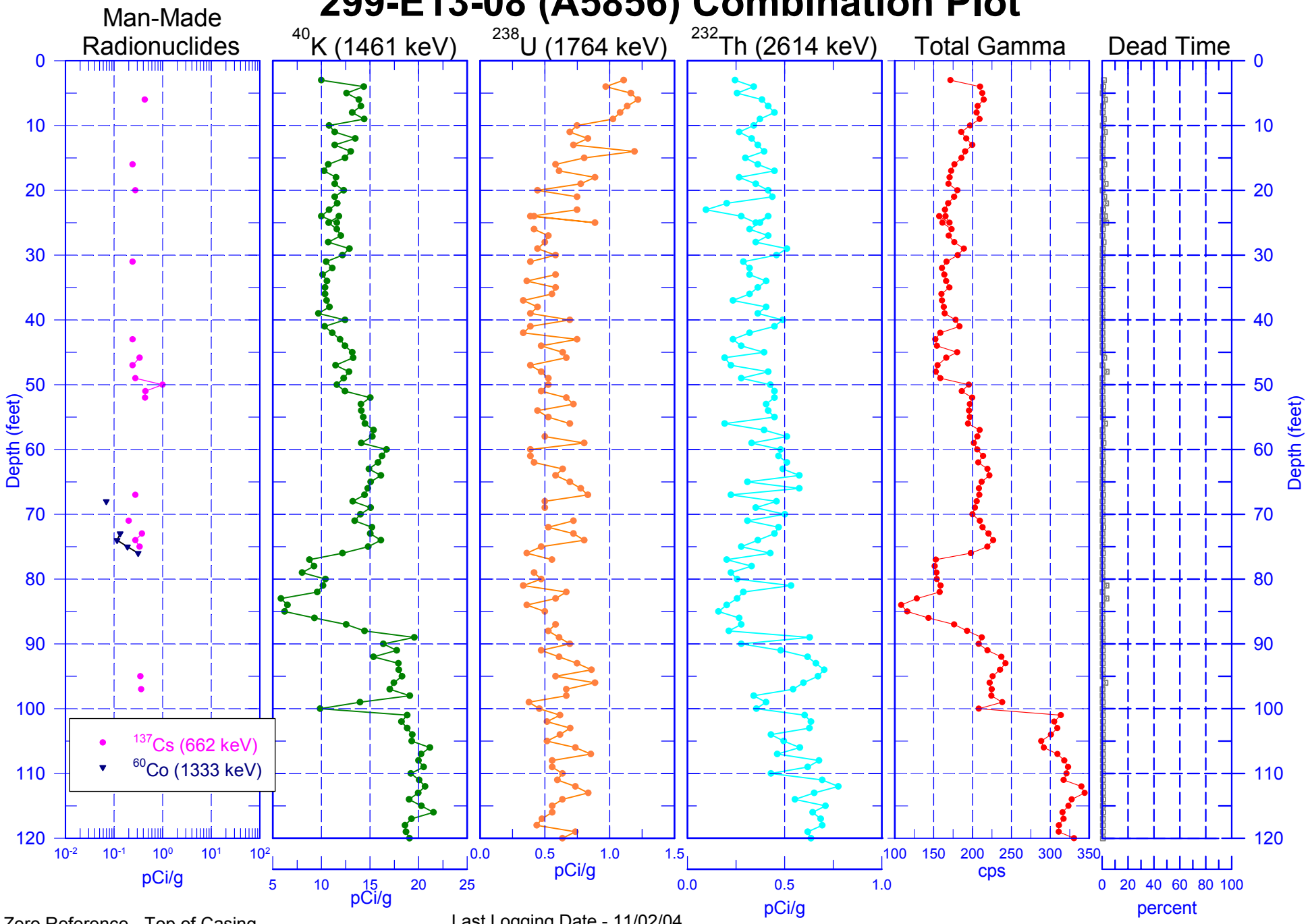
Natural Gamma Logs



Zero Reference - Top of Casing

Last Log Date - 11/02/04

299-E13-08 (A5856) Combination Plot



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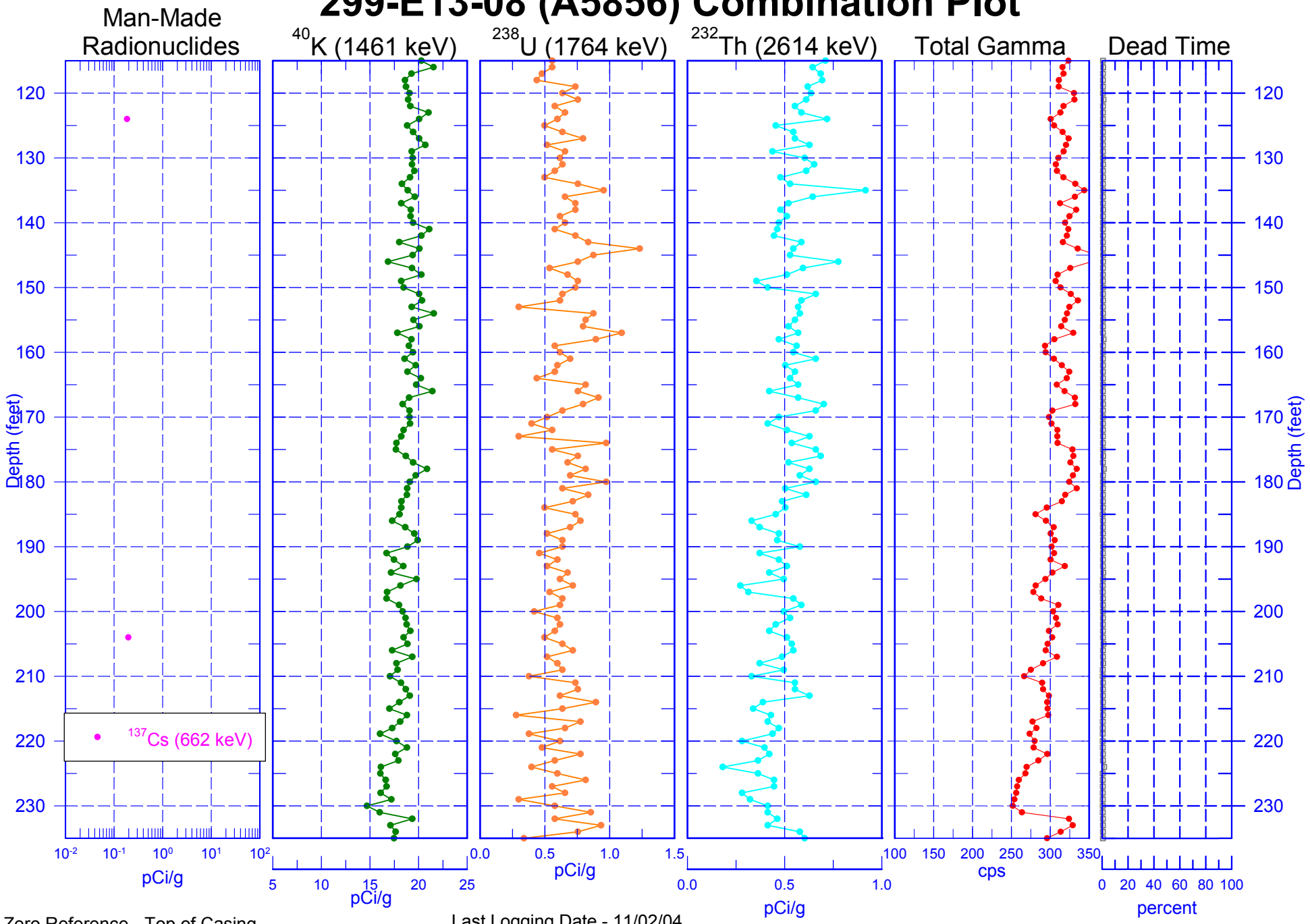

Zero Reference - Top of Casing

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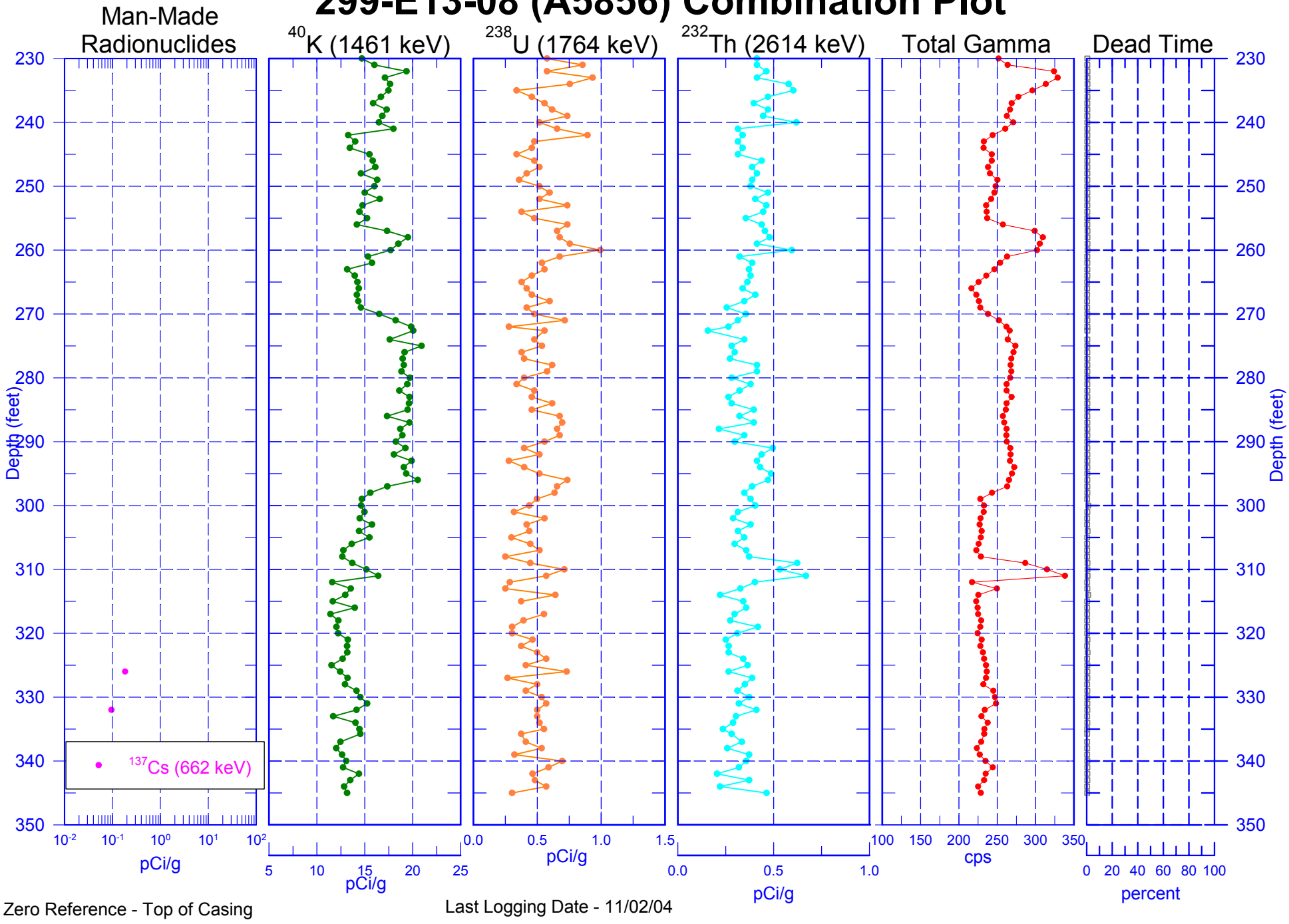

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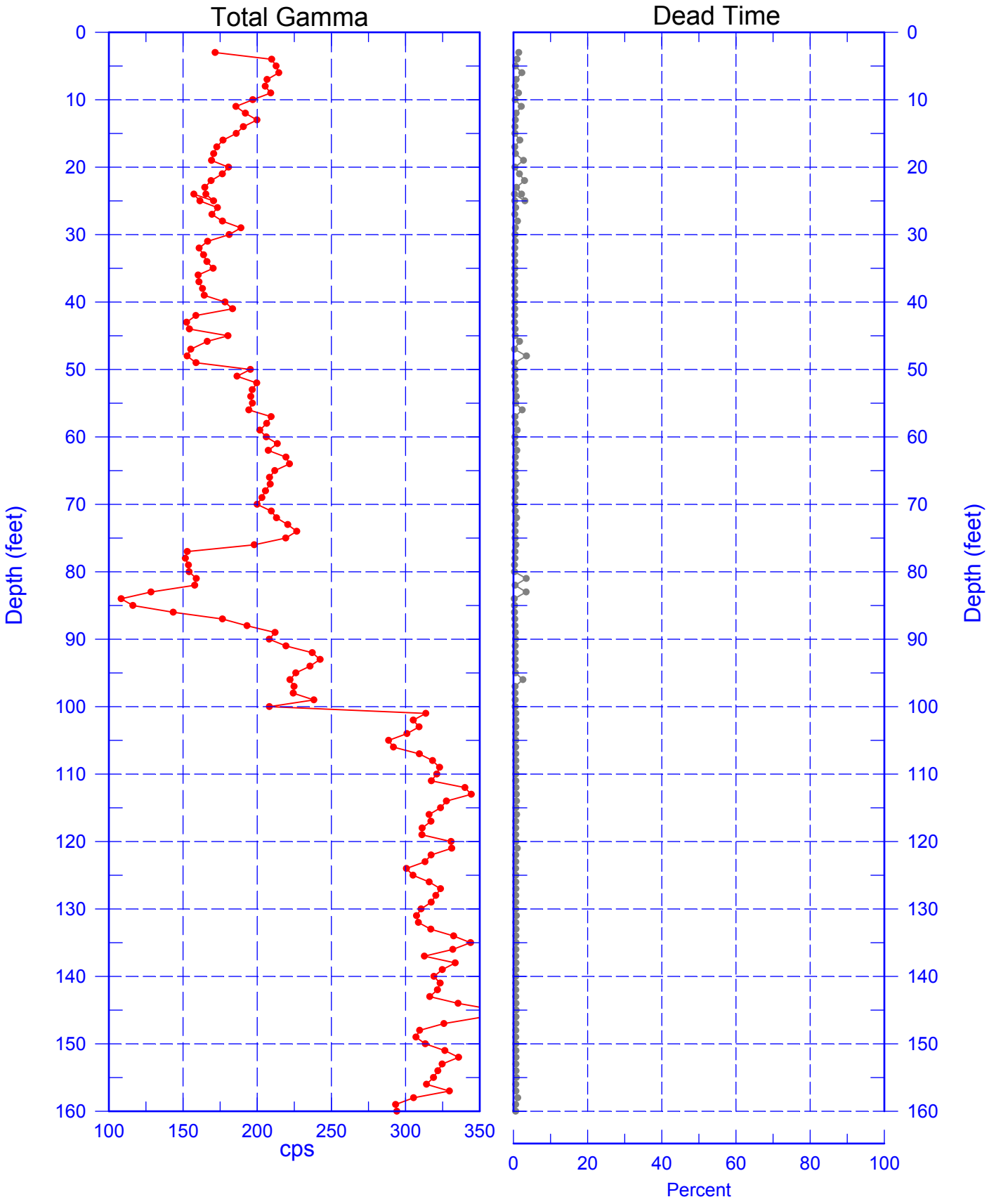
299-E13-08 (A5856)
Total Gamma & Dead Time



Reference - Top of Casing

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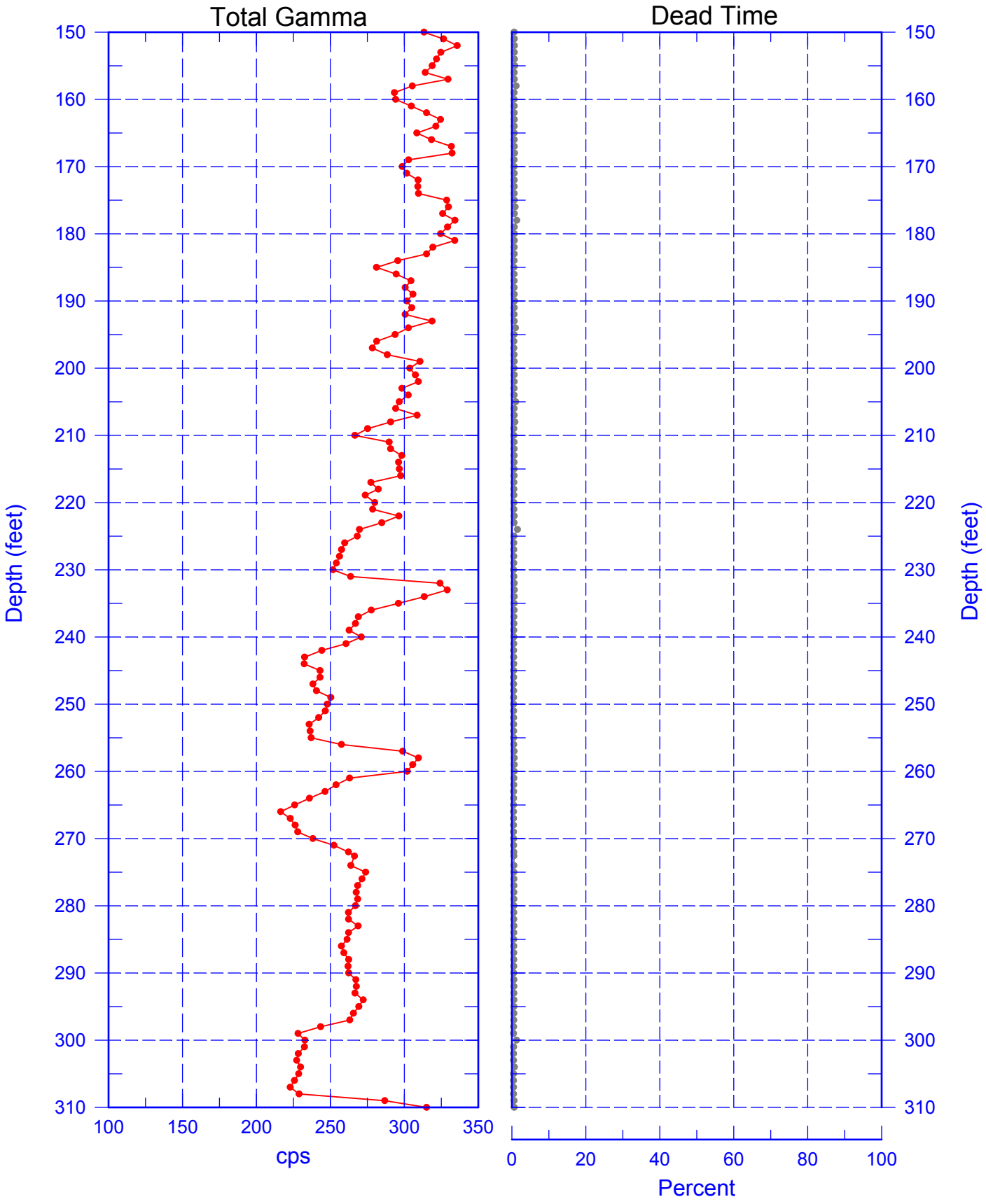
Total Gamma & Dead Time



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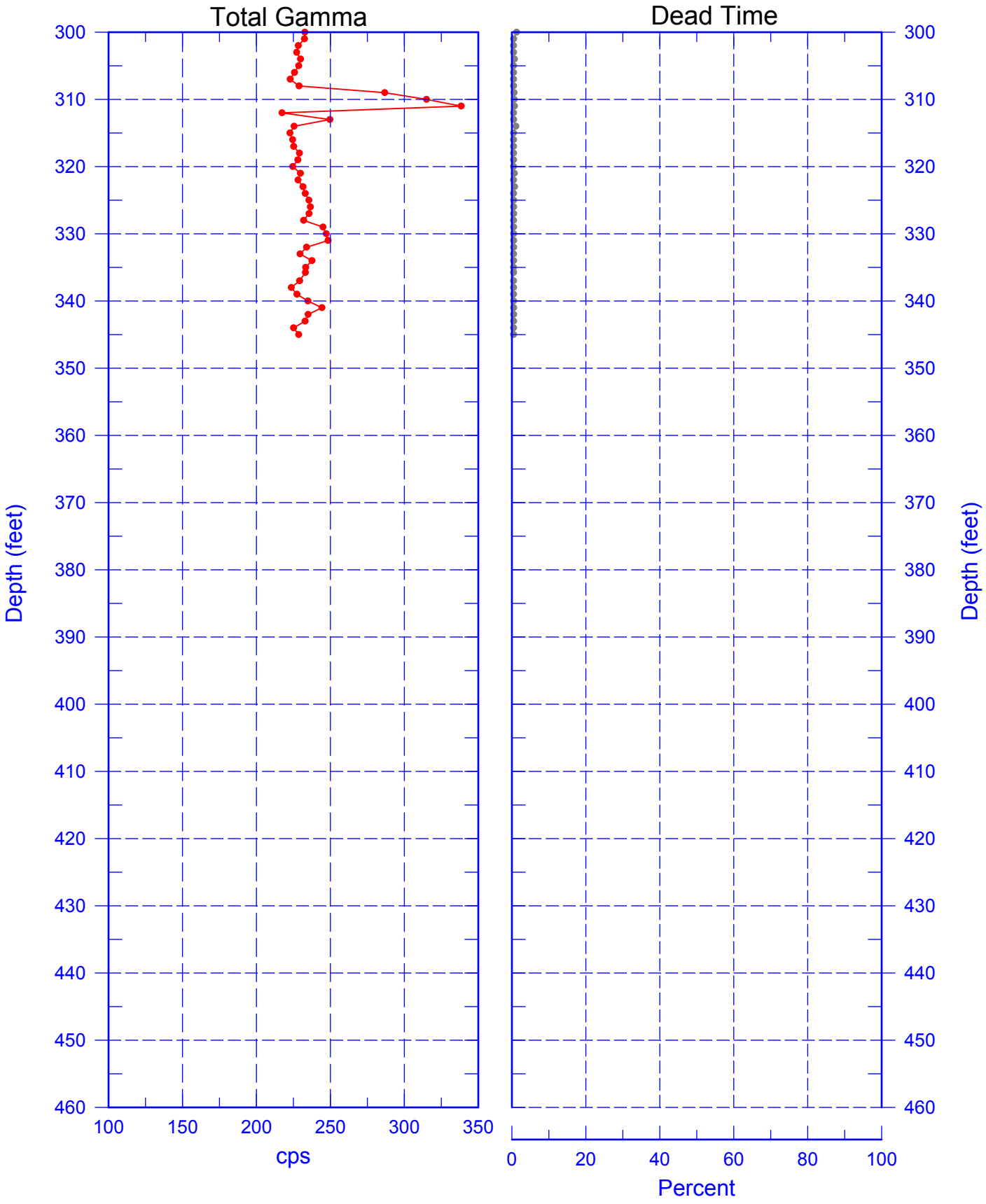
299-E13-08 (A5856)
Total Gamma & Dead Time



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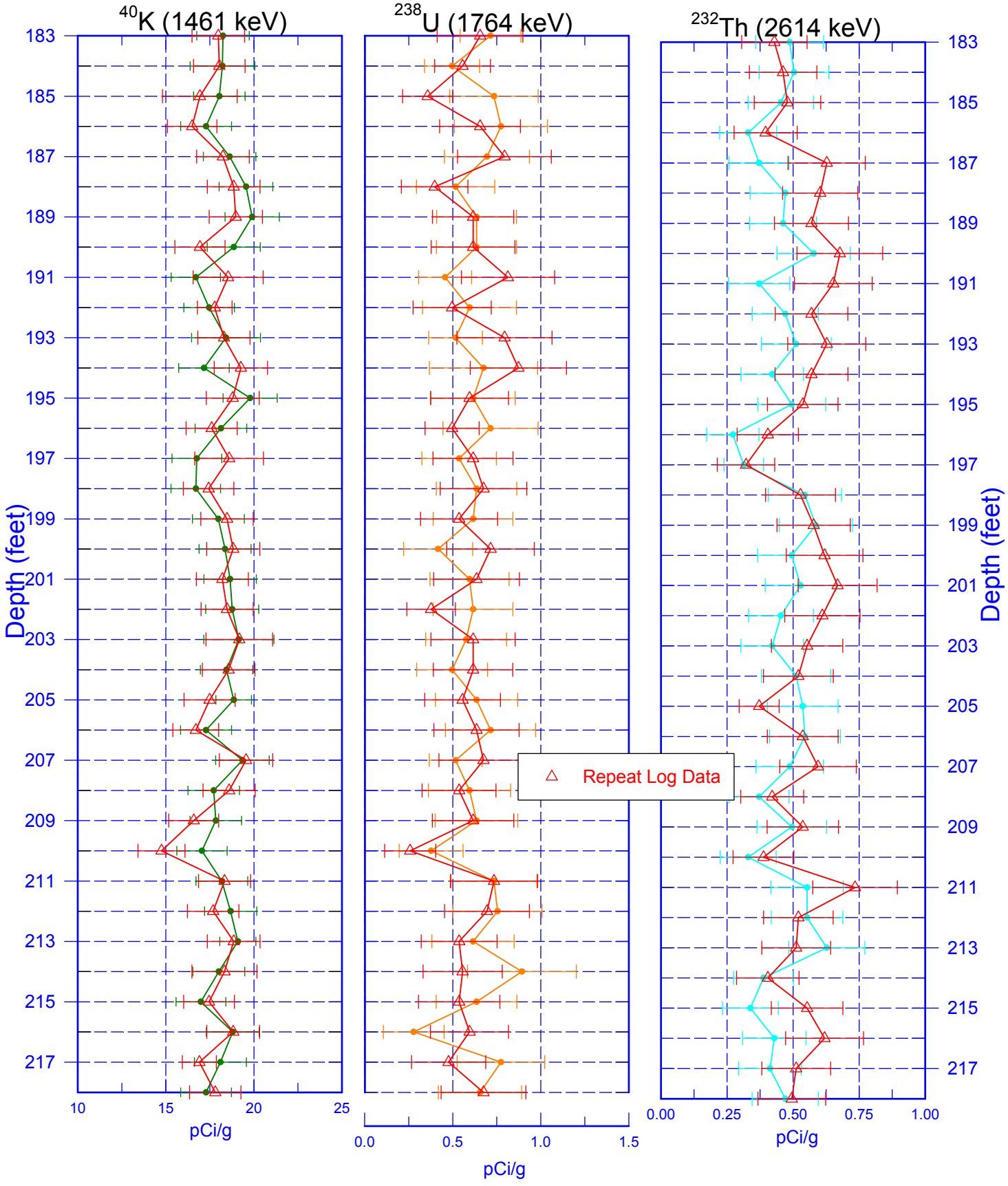
Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing

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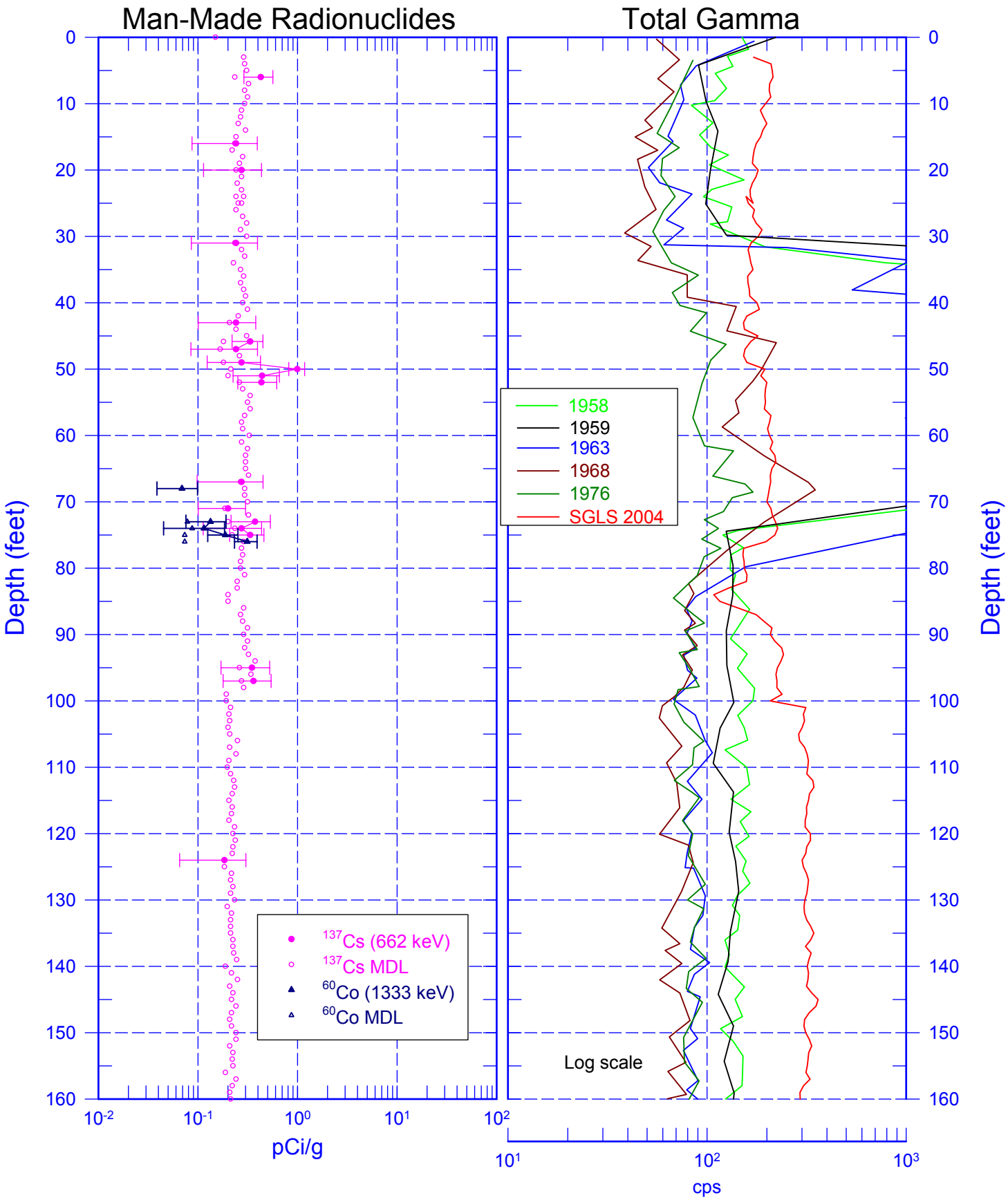

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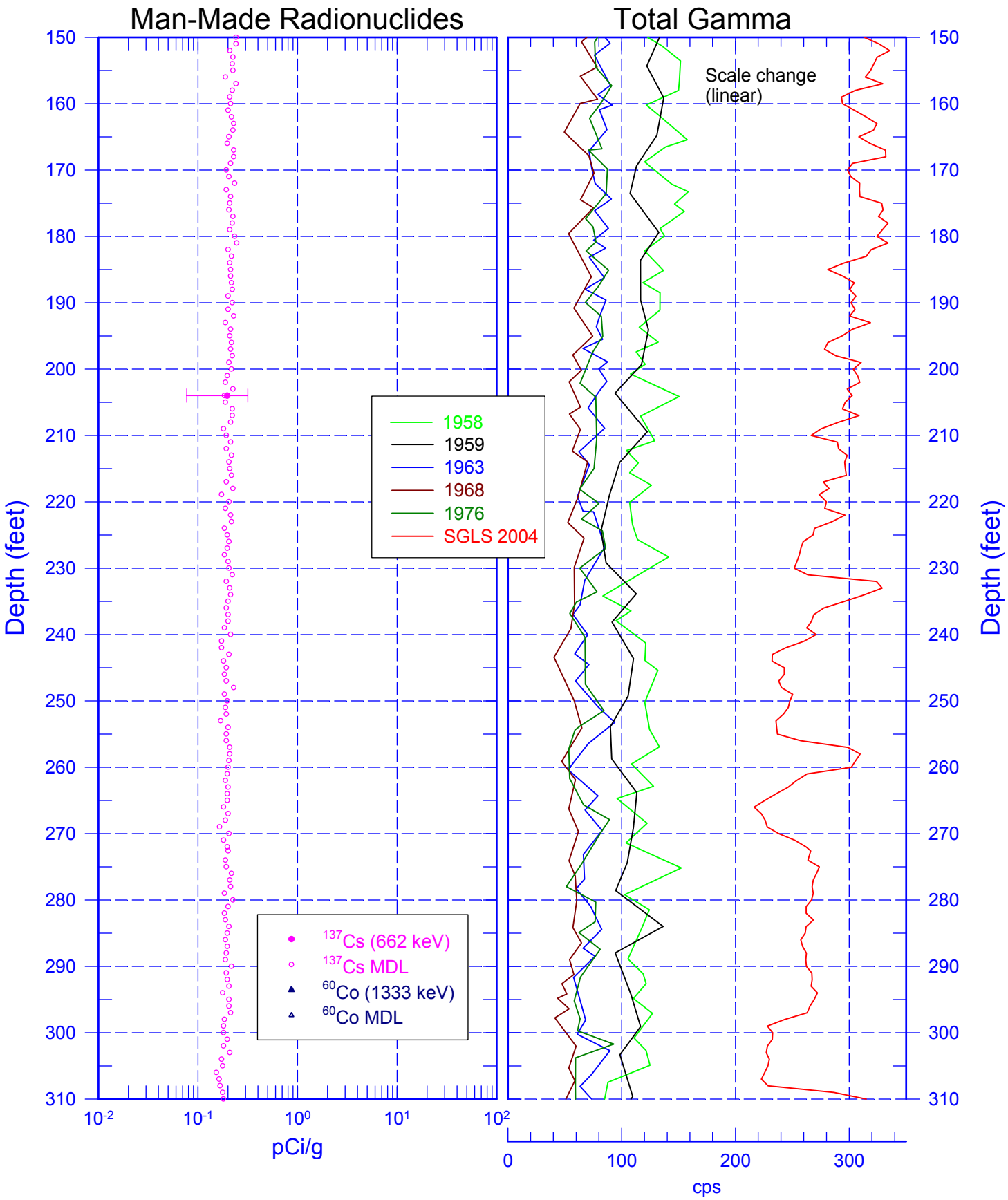

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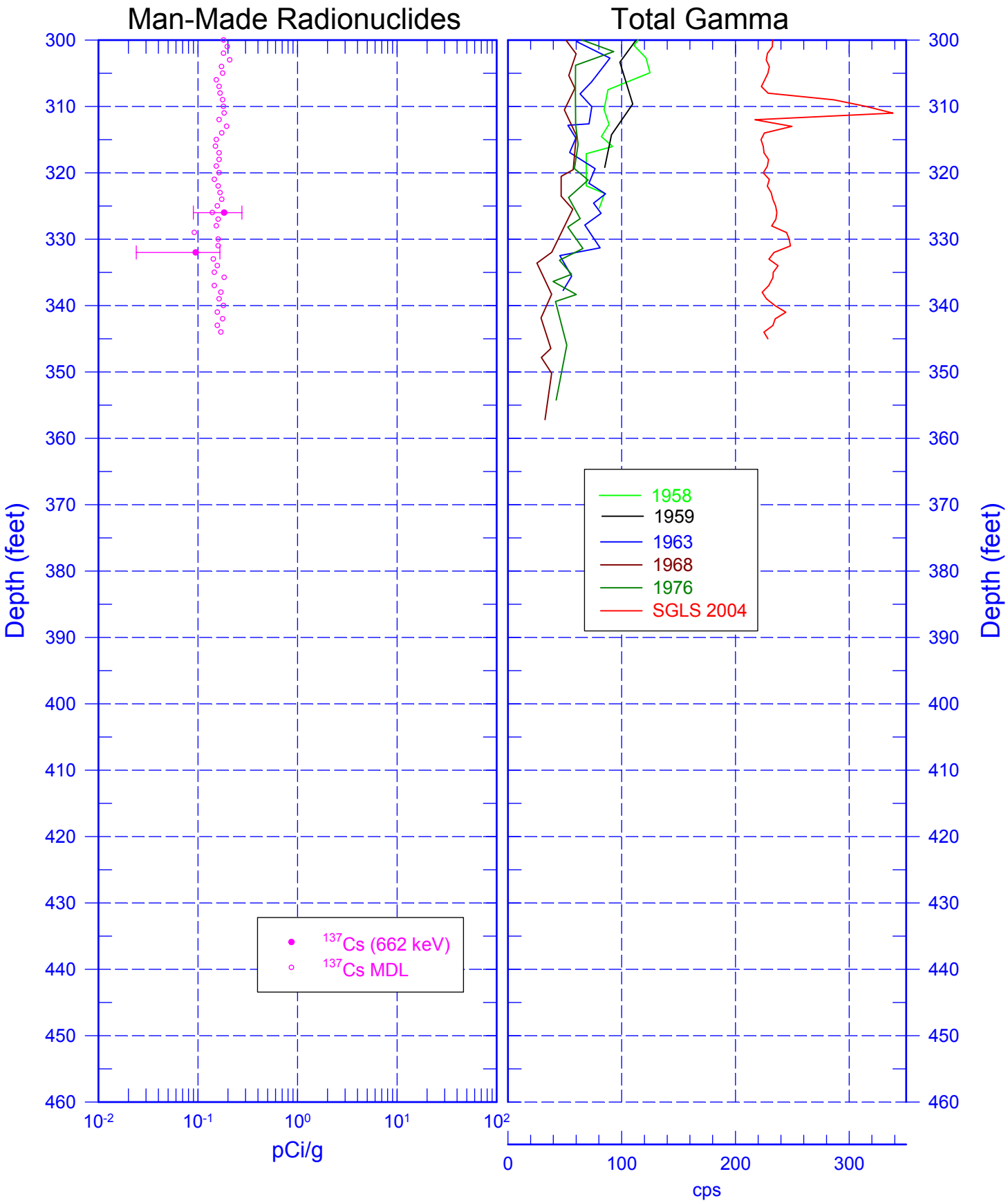

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